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(71) Applicant *(for all designated States except US)*: **STAR-LAB NV/SA** [BE/BE]; Engelandstraat 555, B-1180 Ukkel (BE).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **VAN CONKEL-BERGE, Johan** [BE/BE]; Henleykaai 24, B-9000 Gent (BE). **VAN LAERHOVEN, Kristof** [BE/BE]; Hemelrijk 89a, B-2910 Essen (BE).

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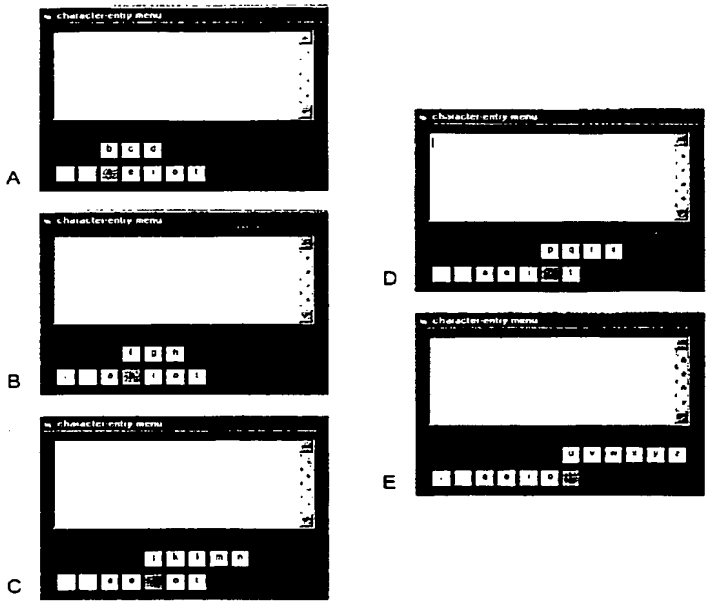

(57) Abstract: The invention features a graphical text entry system (text input device) for electronic handeld device such as a GSM, a PDA or a pager. The system is useful for text entry in the absence of a keyboard and is particularly useful for devices that are used with one hand (to be used with one hand). The graphical text entry system includes a graphical character-entry menu on which characters are positioned according to a known organizing principle like the alphabet, numeral sequence, logical grouping (for e.g. of punctuation signs, calculation signs, arrays of smiley,...)

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TEXT INPUT DEVICE AND GENERAL USER INTERFACE

Background of the Invention

The variety and number of small and hand-held computer devices, including pagers, PDA's, GSM's, Palm PC's and laptop personal computers has increased rapidly. Improved technology has added features, e.g., address books, e-mail, and internet access, while greatly reducing their size. The reduction in size has made alphanumerical data entry more difficult.

Computers intended for use in the living room or family room are now becoming available. Most are dedicated Internet-access and/or CD-ROM units adapted for output on a standard television set. One is a general-purpose computer equipped with a large screen monitor. All are meant to operate in a conventional television-viewing environment. They are hampered, however, by the lack of an appropriate input device. The recent explosive growth of the Internet, the World Wide Web, e-mail, and CD-ROM's have stimulated the development of a wide variety of interactive consumer products and services by a wide variety of industries. This unprecedented level of interest may finally establish computers as a ubiquitous presence like the telephone and the television.

Living room computers present a new human/computer hardware interface problem. Computers have thus far appeared in desktop, laptop, and palmtop configurations. None of these configurations have required an easy-to-use, general-purpose input device. Living room computers generally use input devices adapted from various computers, video game machines, and television sets. These input devices are not always well suited for what is essentially computer operation in a TV viewing framework. The user is relaxing, usually in a reclined position, in a dimly lit room, and interacting with a distant screen. The lack of a desktop or other surface restricts the user to a hand-held or lap-held device. In order to duplicate the success of television, the living room computer should strive to duplicate the appeal of television, which is that it is

an excuse to sit back and relax. Ideally, a living room computer input device would be a transparent addition to the typically effortless television viewing experience.

The growth of mobile Internet access and WAP has a need for a convenient, but small and mobile text input system. Furthermore the wearable computers and intelligent clothing need a data input system with similar requirements.

A keyboard is the standard text input device. Its philosophy is a character per key, which provides very fast typing speeding. However it requires training for proper operation, is cumbersome for casual laptop use, and is fairly fragile. An unskilled user needs substantial room light for hunting and picking. Furthermore keyboards tend to arouse computerphobia, which generates sales resistance in the case of living room computers. Although foldable keyboards occur on the market, or mini-versions sold as a clip-on for a GSM, they are not suited for mobile text input. There are simply too many keys needed to give access to all characters. Moreover, one-handed use of these clip-on keyboards is impossible. The chorded variety of keyboard is sufficiently compact and designed for one-handed use, but learning the chords can be to time-consuming for many users. In addition, many such chorded keyboards do not a feedback system, making it impossible to type blindly. A GSM also features a keyboard philosophy: a character per button. But since a GSM only contains 12 buttons (inherent to the phone key layout) instead of 26, the alphabet is spread over those 12 buttons. By choosing a button you select first an array of three characters, and by pressing it one, two or three times you choose the character you actually wanted. This approach is widely used, but can have certain disadvantages. Typing remains quite slow because the user must press the same button several times to type one character. Time delays are often built in. This slows down the typing of two succeeding characters that are positioned on the same key. Special vowels, punctuation marks, and special symbols are a burden to type. The characters are spread arbitrarily over the 12 buttons without regard to character frequency. Since the characters are spread out arbitrarily, a user must endeavor to learn the key layout by heart. The 12 buttons can take up considerable room.

A system referred to as T9 forms an improvement on the GSM key layout. This system attempts to overcome the burden of having to push the same key two or three times by a prediction algorithm that guesses what character of the three characters under that button you wanted to type.

An alternative approach entails providing an image of an actual small-sized keyboard on the display of a handheld computer device. Thus, the LCD display displays a keyboard, such as would be available in a regular computer or typewriter, and the user touches each of the LCD-displayed keys to enter data. This reduces the number of keys needed, but has other drawbacks related to the need for a touch-screen and the large amount of information content in a displayed keyboard. Moreover, a larger keyboard display requires significant portion of the display screen. Finally, reduced-sized keyboard displays provide keys which are too small to type using fingers. As a consequence, users must use a stylus, pen or some other handheld instrument to touch the keyboard keys.

Data entry can be performed through handwriting recognition. While this method is improved, it is still necessary for the user to use two hands to enter the data, one hand to hold the apparatus and one hand to write on the screen. Additionally, the apparatus must interpret the handwriting into a computer readable format, and the procedure for doing so is time consuming and is also less than 100% accurate. Furthermore, the variety of characters that may be entered may be limited based on the ability of the apparatus to discern between various handwritten symbols. Some systems have attempted to improve recognition by requiring the user to learn and use a special format of handwriting, but this burdens the learning process.

Automatic speech recognition technologies can be used to data input. However, many such systems are error prone. They can also be very expensive in terms of system resources such as special hardware devices, CPU and memory consumption.
Devices patterned after a TV remote control device offer another alternative for data entry. They can be limited by lack of a pointing device, although some do have a

trackball, and by the difficulty in interpreting a large number of keys, particularly in porr lighting.

Pointing devices, including a mouse, joystick, trackball, tablet, and touchpad, do not offer text input capability. Adaptive systems for the disabled offer various text input alternatives based on some of the various pointing devices. However, they are not mobile at all and tend to be tedious for non-disabled users. Also, they often make use of large on-screen keyboards that occupy large amounts of valuable display area.

It would be beneficial to provide a text entry system for a small, hand-held computer device or a small, hand-held electronic consumer device in which text can be entered using only one hand in a quick and easy manner, and which provides a full range of characters which may be entered by the user.

Summary of the Invention

The invention relates to an apparatus and method for entering text on a small, portable, hand-held electronic device, and more particularly to a graphical character-entry menu for allowing entry of data on a small, portable, hand-held consumer devices, e.g., a hand-held units such as GSM's, WAP devices, pagers, watches, PDA's and wearable computers.

The present invention addresses the problem of inefficiency of data input methods based on keyboard tapping as implemented in GSM's, pagers, small hand-held computers, PDA' and wearable computers. Since these products are intended to be hand-held and easily portable, they have been designed for small size. As a consequence, display real estate is often small so that the user interface must take the display size into account.

The invention features a graphical text entry system (text input device) for electronic handheld device such as a GSM, a PDA or a pager. The system is useful for text entry in the absence of a keyboard and is particularly useful for devices that are used with one hand (to be used with one hand). The graphical text entry system includes a graphical text entry screen and a graphical character-entry menu on which characters are

positioned according to a known organizing principle like the alphabet, numeral sequence, logical grouping (for e.g. of punctuation signs, calculation signs, arrays of smileys, ...) .

The system includes a display-based character navigation text input interface displayed on the graphical text entry screen. The system also includes a scrolling (navigation) device to which allows the user to navigate through the character-entry menu to allow the user to select one of the characters on the character-entry menu to be entered. A method for entering text into an electronic device using the character-entry menu of the invention is also provided. After selection of one or more characters, the graphical text entry system may provide suggested next characters to aid in text entry. The system permits the user to pick and choose a character from the two-lined contracted alphabet and/or select and enter a character from the character-entry menu. Addition methods are provided for entering capital letters, deleting characters, shuffling between character sets, and entering and displaying special characters (e.g., â ç @ ö)

Accordingly, it is an object of this invention to provide an improved text entry system for a small consumer product.

Another object of the invention is to provide an improved text entry system for entering text on a graphical screen on a small consumer product.

A further object of the invention is to provide an improved text entry system for entering text on a graphical interface of a small consumer product in which the material can be entered using only one hand of the user.

A still further object of the invention is to provide an improved text entry system for a small consumer product whereby text is entered on a graphical character-entry menu on a graphical interface on a small consumer product.

Yet another object of the invention is to provide an improved text entry system for a small consumer product including a graphical character-entry menu which allows for the entry of any number of different characters by a user.

Another object of the invention is to provide means for this improved text entry system (for a small consumer product including a graphical character-entry menu which

allows for the entry of any number of different characters by a user) that are multi-functional, i.e. that these means could easily be used to navigate through menus, activate functions, control audio or video devices acting as a general remote control.

Still other objects and advantages of the invention will in part be obvious and in part be apparent from the specification and the drawings.

Description of the Drawings

FIGS. 1A to 1E depict one arrangement an alphabet array in the character-entry menu.

FIG. 2 depicts one arrangement for a punctuation mark array.

FIG. 3 depicts one arrangement for an array of computer suggested letters.

FIG. 4 shows one example of how the default position forms the crossroad of the character-entry menu (for improved orientation).

FIGS. 5A to 5B depict a character-entry menu in the metaphor of a string with loops.

FIGS. 6A to 6D depict the steps to highlight and type a character positioned on the string (the lower line), in this case the "e".

FIGS. 7A to 7F depict the steps to highlight and type a character positioned on one of the loops (the upper line), in this case the "g".

FIGS. 8A to 8H depict the steps to highlight and type a special character similar to a character positioned on the string (the lower line), in this case the "â".

FIGS. 9A to 9H depict the steps to highlight and type a special character similar to a character positioned one of the loops (the upper line), in this case the "ÿ".

FIGS. 10A to 10F depict an example of arrays of special characters.

FIGS. 11A to 11F depict the steps to highlight and type a capital version of a character, in this case a character positioned on one of the loops (the upper line), more specifically the "G".

FIGS. 12A to 12E depict an example of a character set of numbers and the steps to highlight and type a desired number, in this case the "8".

FIGS. 13A to 13F depict scrolling through the character set of special signs to search a particular sign.

FIGS. 14A to 14B show a preferred embodiment of the small electronic device and its key layout.

The drawings use the following reference numerals: 01 graphics screen, 02 text input field, 03 character-entry menu, 04 backbone (lower line) of the character-entry menu, 05 loop (upper line) of the character-entry menu, 06 highlighted character 07 cursor of a text program, 08 array of common used punctuation marks, and 09 array of computer suggested characters.

Detailed Description

Generally speaking, in accordance with the invention, a small consumer product having a graphical character-entry menu is to provide an improved text entry system for a small consumer product. The graphical character-entry menu is pictured on the graphical interface screen of the small consumer product. Using a small button, joystick or other pointing device, e.g., located on the side of the object, which may be manipulated by a user's hand while holding the small consumer product in that same hand, the user may navigate through the graphical character-entry menu to a particular desired character. The user may also enter a particular text character by performing a further predetermined operation with the button, joystick or the like.

In a further aspect of the invention, an array is provided in which the graphical text character-entry menu recognizes a first, or subsequent character entered by the user, and thereafter makes suggestions of characters that the user may be attempting to enter. Thus, the user can navigate and select these suggested rather than navigate through the entire character-entry menu to find the desired character.

In another aspect of the invention, the user may perform a further function with the button, joystick or the like, in order to shuffle between various character sets in the character-entry menu, thereby allowing for the entry of any number of characters. Each

set of characters preferably is contained on a different array of the menu, allowing the user to view and use these character sets as desired.

The method of the present invention provides a small consumer device with a convenient text input capability. The basic structure of this method provides a navigation device with a conventionally ordered alphanumeric array whose characters are shown in a menu structure on the screen of the consumer device, allowing the user to navigate to the desired target character, guided by the knowledge of alphabetical and numerical order, before initiating input of that character.

The user can monitor the on-screen text output continuously, without any visual reference to an input device. This eliminates the need for hunting and pecking and allows for use in condition of low ambient light. The method can be learned in a matter of seconds, has a near-zero error rate, and input speed increases intuitively with continued use. It occupies no permanent screen space, only limited space when one actually wants to type text.

The text-input method of the present invention enables a small hand-held consumer device to function as an easy-to-use, general-purpose computer input device, well suited for use with various information and communication appliances. A graphical text entry system (text input device) is provided to a small electronic handheld device such as a GSM, a PDA or a pager (to be used with one hand). The graphical text entry system includes a graphical text entry screen and a graphical character-entry menu on which a plurality of characters is positioned according to a known organizing principle like the alphabet, numeral sequence, logical grouping (for e.g. of punctuation signs, calculation signs, arrays of smileys, ...) displayed on the graphical text entry screen. This method of text entry could also be called a display-based character -navigation text input interface.

The system also includes a scroll (navigation) device. The device allows the user to navigate through the character-entry menu to allow selection one of the characters on the character-entry menu to be entered. A method for entering text into an electronic device using the character-entry menu of the invention is also provided. After selection

of one or more characters, the graphical text entry system may provide suggested next characters to aid in text entry. For example, the user can pick and choose a character from the two-lined compressed alphabet or select and enter a character from the character-entry menu. Additional methods are provided for: entering capitals, deleting characters, shuffling between character sets, and displaying special characters (e.g. â ç @ ö)

In accordance with the invention the alphabet is shown on a screen through which the user has to navigate to select a character. The alphabet is structured in the graphical character-entry menu as explained below. The alphabet is divided in two (or more, eg., three or four or more) lines (FIGS. 1A to 1E), which form a character-entry menu. For example, the lower line contains characters that are used often: "a", "e", "i", "o", "t", the space and the punctuation mark (together about 60% of plain English text). Because four of these are vowels, orientation through the alphabet is facilitated. The upper line contains the characters in between the two characters in the lower line. In this way the lower line functions as an index for the upper line. Thus, when "a" is highlighted on te lower line (FIG. 1A), "b c d" is shown in the upper line (between "a" and "e"). In this way one can scroll on a limited screen through the entire alphabet to search a particular character (FIGS. 1A to 1E). When the punctuation mark (FIG 2) is highlighted on the lower line, the upper line shows an array of the most common used punctuation marks. When the space (FIG. 3) is highlighted on the lower line, the upper line shows an array of computer suggested characters based on previous typed characters. This software algorithm is also self-learning which reduces the amount of scrolling through the character-entry menu drastically.

Because the alphabet is shown in a compressed way, it is shown in sufficient detail without losing an overview. The user can easily go and search for a desired character. Only the relevant part of the alphabet is shown according to which character currently is highlighted. After a character is entered, the interface refreshes into its default position (FIG. 3), allowing blind typing. Furthermore the space is the default position (and thus is highlighted) because it's the most common used character in plain

English text and because the interface is designed so it forms the crossroads (FIG. 4) of the array of computer suggested characters (upper line), the punctuation marks array (left), and the actual alphabet (right). This default position enhances user orientation and provides a quicker access. Of course, the locations at the crossroads can be varied. For example, the suggest characters could be to the left and the punctuation marks above.

The graphical character-entry menu can be visualized as a string containing the alphabet. Because the string is too long to fit a small screen you compress it, which gives a string with loops (FIG. 5A). The backbone of the string contains the most frequent used characters and the loops the intermediate characters. Scrolling through the entire string with loops (FIG. 5A) to highlight and type a certain character would be very slow. Therefore, by default the user scrolls only through the backbone of the string (FIG. 5B) and bypasses the loops. This speeds up typing since the backbone of string contains the most frequent used characters. As a consequence of this arrangement, a user-input action is needed to navigate through the loops. It is preferable to not display the entire string with all its loops on a small display. Therefore only one loop is shown at once, depending on the character highlighted on the string. Of course, it is possible to display two, three or four loops or even more loops. As the user highlights other characters on the string, the other loops are shown and hidden. According to this invention the string always gives a fixed overview of the alphabet, and the changing loops contain the other, less used characters.

Example 1: Entering an "E"

A navigation means is given to navigate through the lower line of the character-entry menu. This navigation means allows the user to highlight one of the characters on the lower line. An entering means is given to type the selected character. In this case a navigation and enter action are needed to type the desired character. FIGS 6A to 6D show the steps to highlight and type the "e".

Example 2: Entering a "G"

A navigation means is given to navigate through the lower line of the character-entry menu. This navigation means allows the user to highlight one of the characters on the lower line. This automatically causes the upper line to display different characters. A switch-of-line means is given to switch from the lower line to the upper line (or from upper to lower). If necessary, the user can again use the same navigation means to highlight the desired character of the upper array. The same entering means of Example 1 is given to type the selected character. In this case a navigation, switch-of-line, possibly another navigation and eventually an enter action are needed to type the desired character. FIGS. 7A to 7F depict the steps to highlight and type the "g".

Example 3: Entering Special Characters

Many special characters, e.g., â, ç, @ and ö, are similar to common characters, in this case: a, c, a and o respectively. Thus, following procedure can be used to access special characters. By means of Example 1 and Example 2 the user can highlight any ordinary character. A show-special-character means is given to clear the upper line and to display all possible special characters similar to the highlighted character (presuming there are any) on this upper line. Doing this also highlights the first character of this upper line. If necessary, the user can again use the same navigation to highlight the desired character. The entering means of Example 1 is used type the selected character. In this case a navigation, possibly a switch-of-line, possibly another navigation, a show-special- character, possibly another navigation and eventually an enter action are used to type the desired special character. FIGS. 8A to 8H show the steps to highlight and type the "â". FIGS. 9A to 9H show the same for the "ÿ". FIGS. 10A to 10F are examples of arrays of special characters.

Example 4: Entering a Capital Letter

Using the methods of Examples 1, 2, and 3, the user can highlight any desired character or special character. A "make-capital" means is used to type directly the capital version of this character or special character.

5

1. A computer device, comprising:

a display means for displaying at least a first subset of characters in an ordered character set, each character in the subset being associated with a subset of characters that are contiguous in the ordered character set;

a first detection means for detecting user selection of a displayed symbol;

a response means, responsive to the user selection, for displaying the subset of contiguous characters associated with the selected character of the first subset;

a second detection means for detecting user selection of a character in the selected subset of contiguous characters; and

means for, response to detection by the second detection means, for treating the selected character in the selected subset as a text input.

2. The computer device of claim 1,comprising a display screen and a plurality of user input buttons, wherein the first and second detection means include means for the detecting the pressing of a user input button.

3. The computer device of claim 1, comprising a touch sensitive screen, different characters being displayed on different regions of the touch screen, wherein the first and second detection means include means for detecting touching of the touch screen.

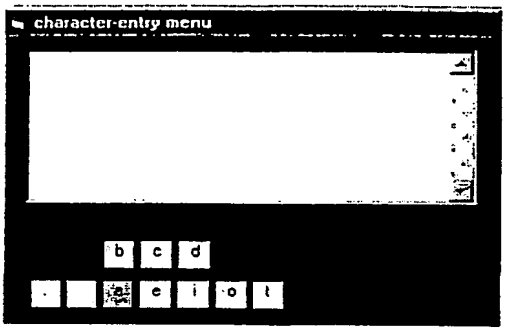


fig 1A

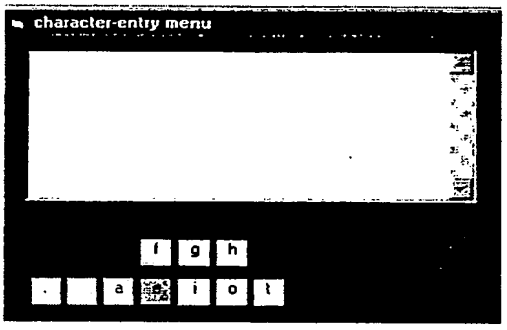


fig 1B

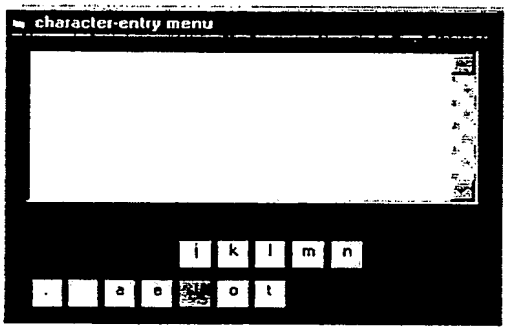


fig 1C

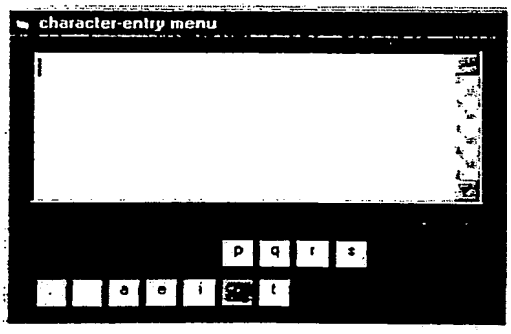


fig 1D

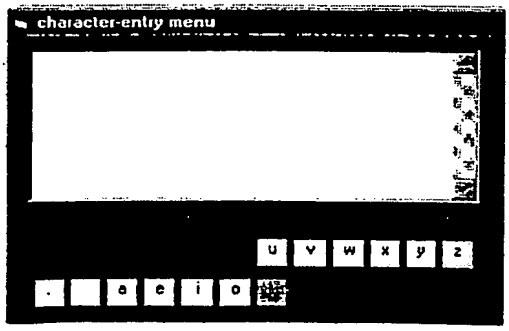


fig 1E

fig 2

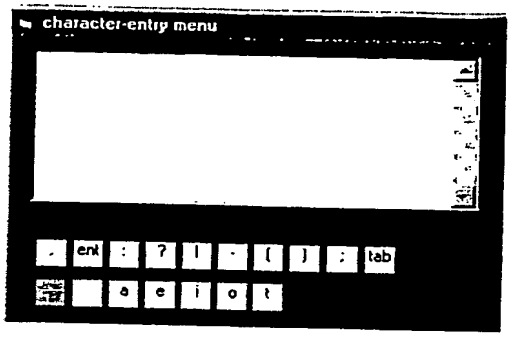


fig 3

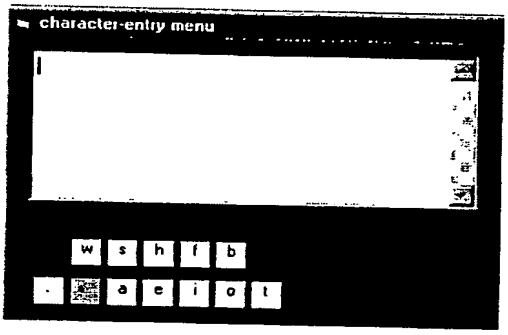


fig 4

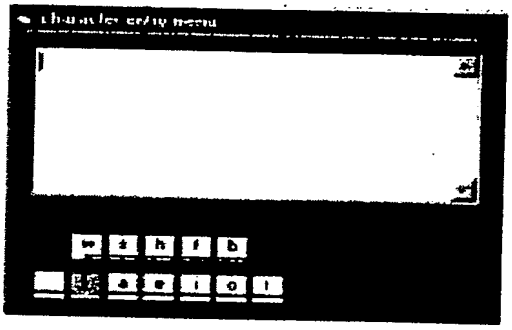


fig 5A

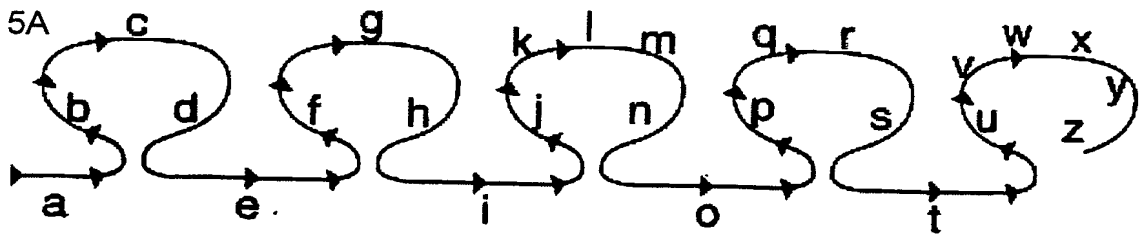
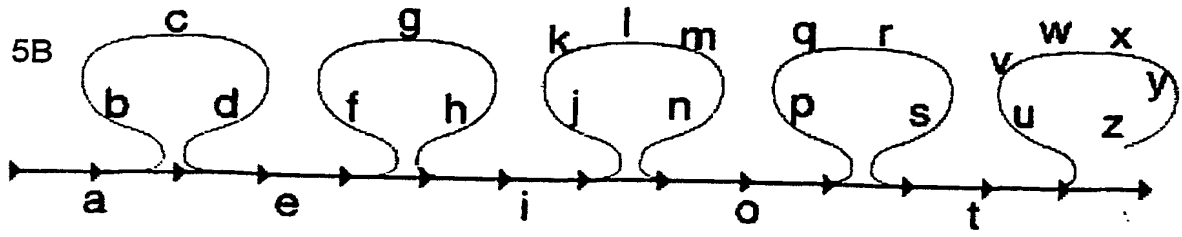


fig 5B



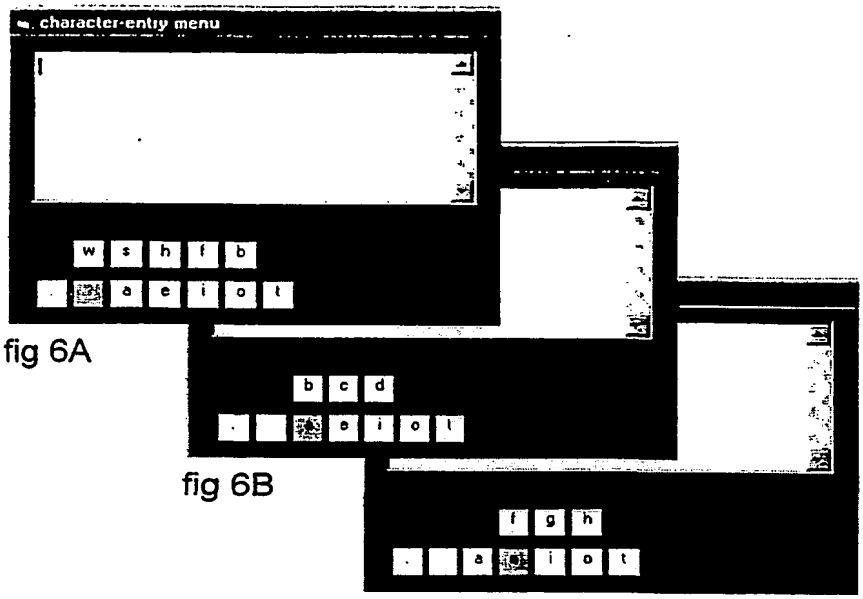


fig 6A

fig 6B

fig 6C

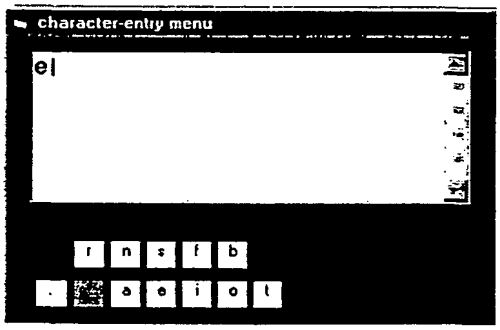


fig 6D

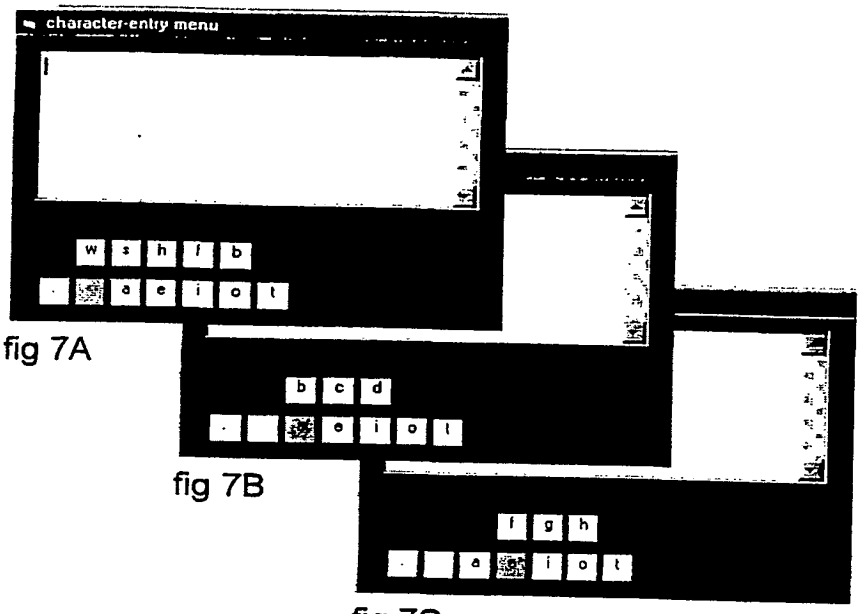


fig 7A

fig 7B

fig 7C

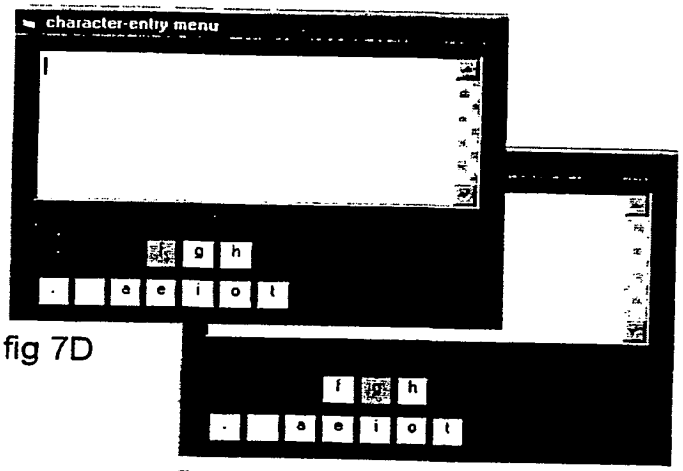


fig 7D

fig 7E

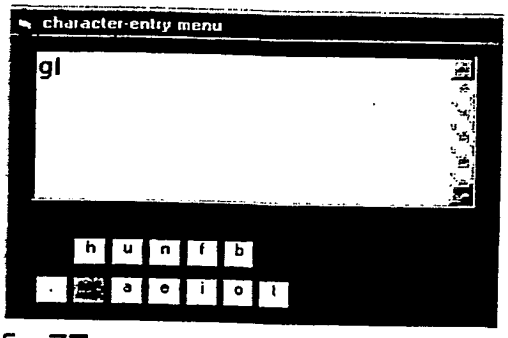


fig 7F

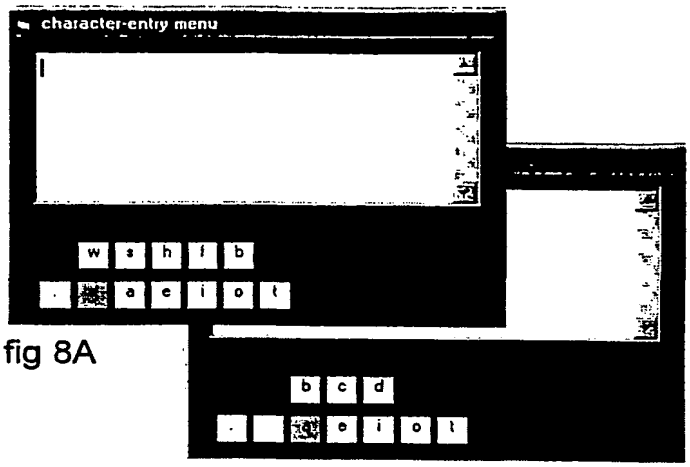


fig 8A

fig 8B

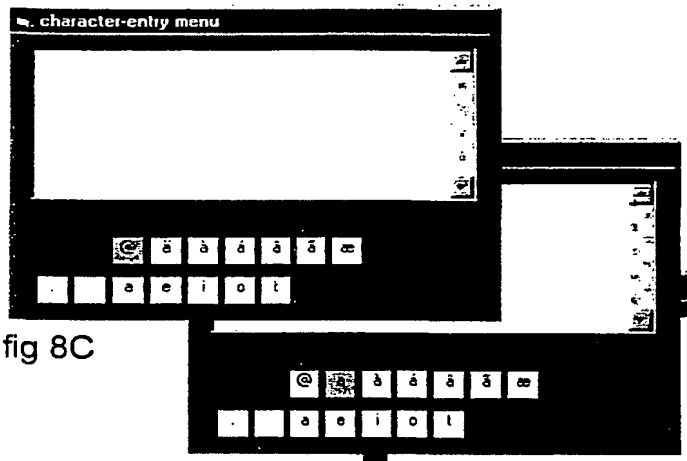


fig 8C

fig 8D

fig 8E

fig 8F

fig 8G

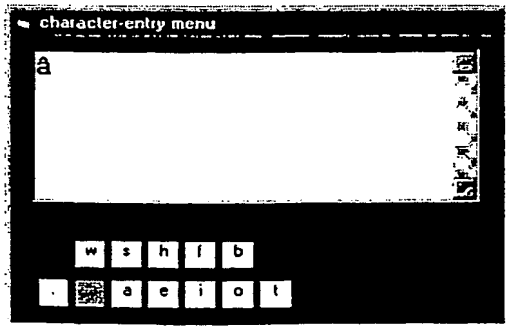


fig 8H

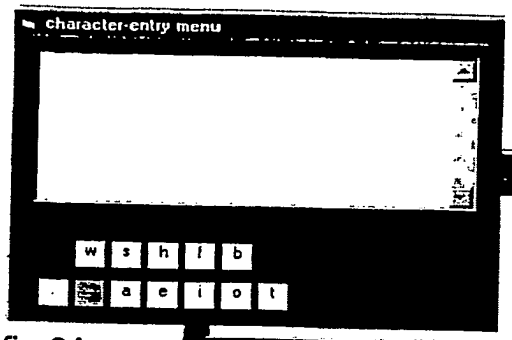


fig 9A

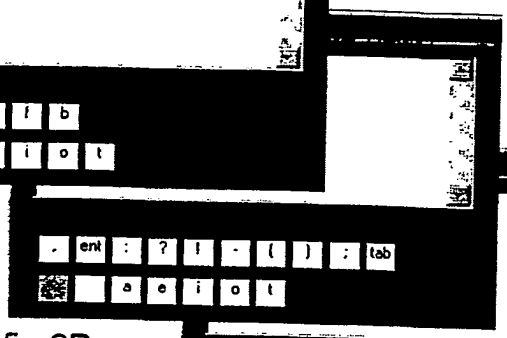


fig 9B

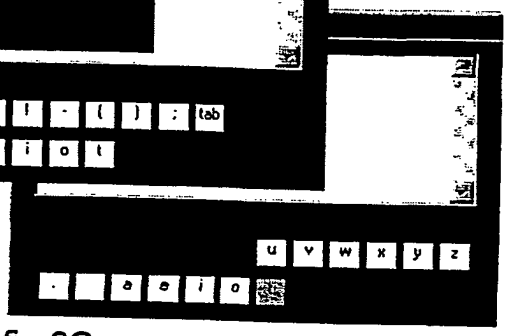
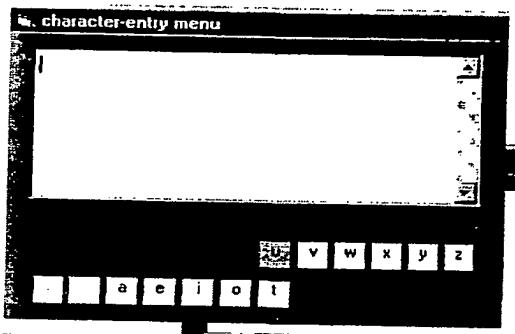


fig 9C



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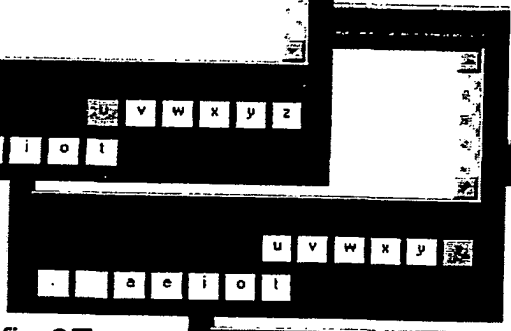

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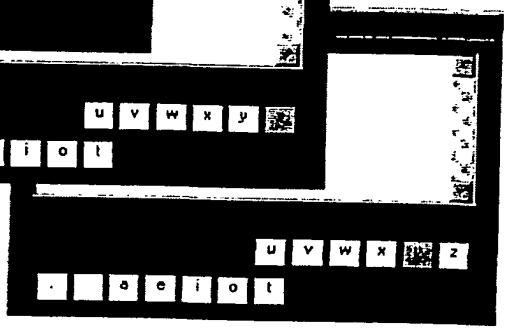


fig 9F

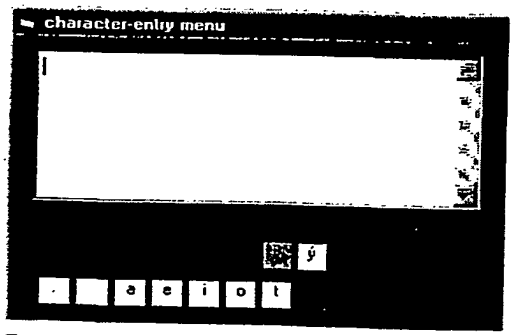


fig 9G

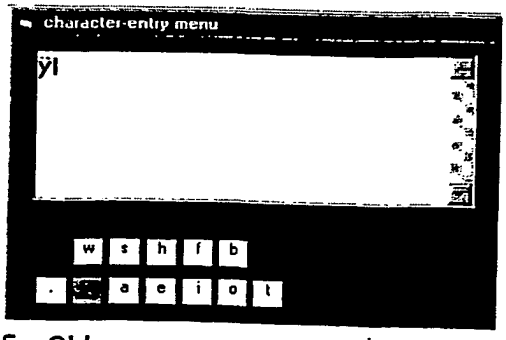


fig 9H

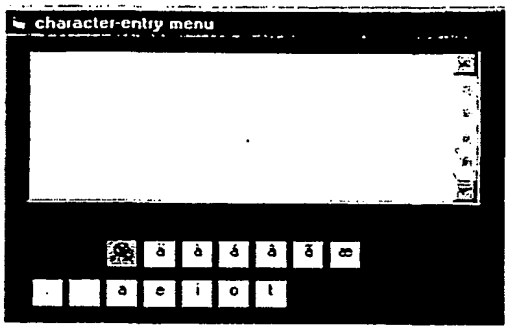


fig 10A

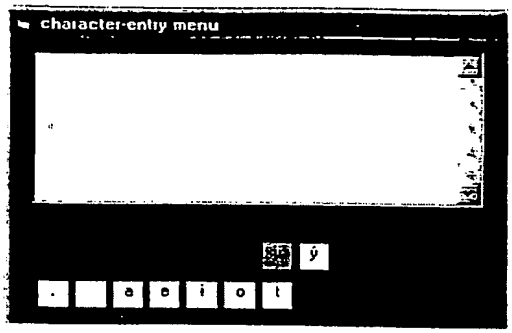


fig 10F

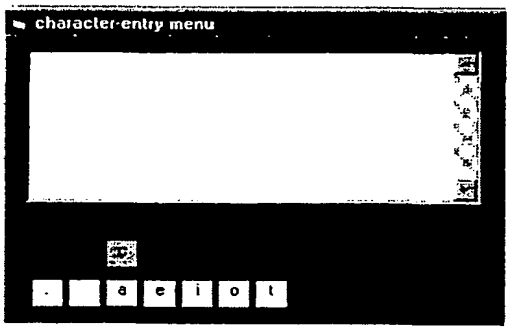


fig 10B

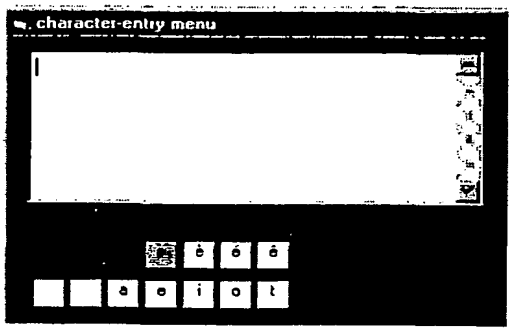


fig 10C

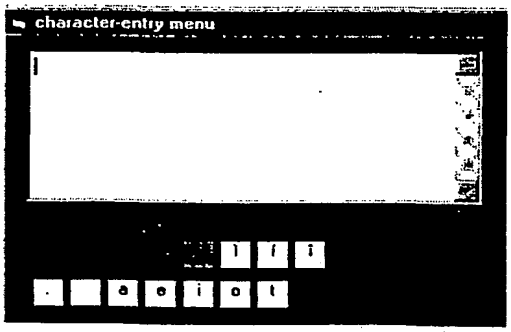


fig 10D

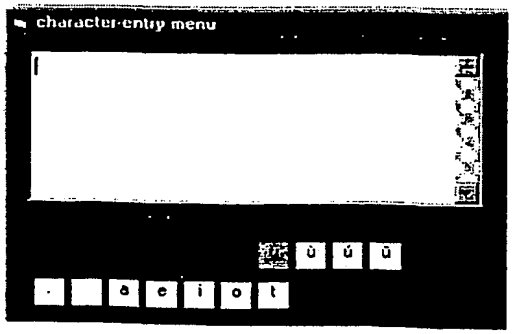


fig 10E

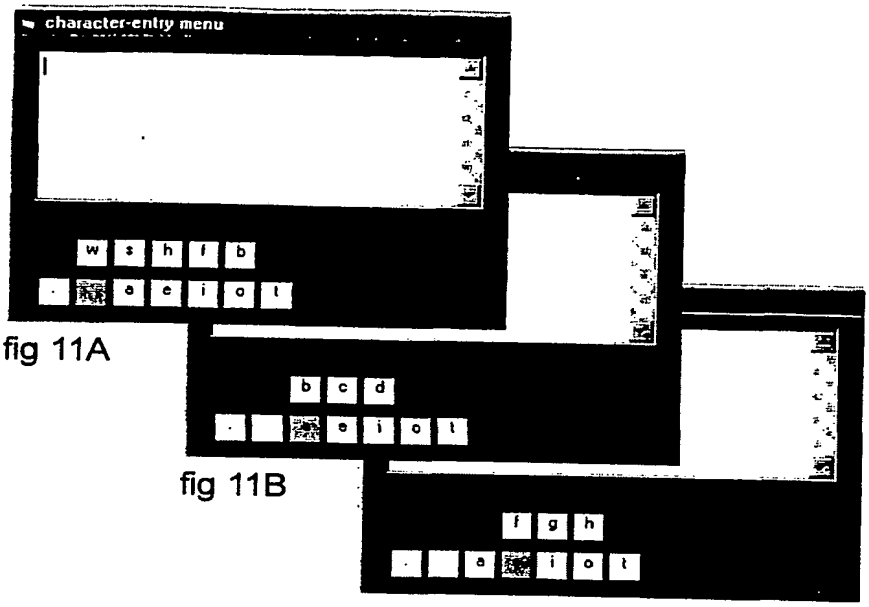


fig 11A

fig 11B

fig 11C

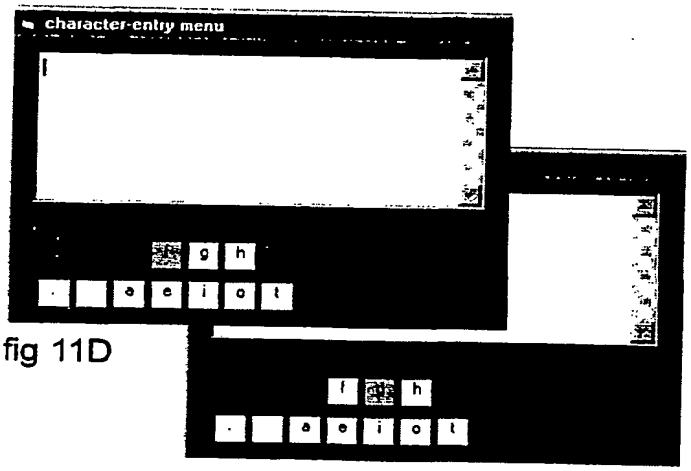


fig 11D

fig 11E

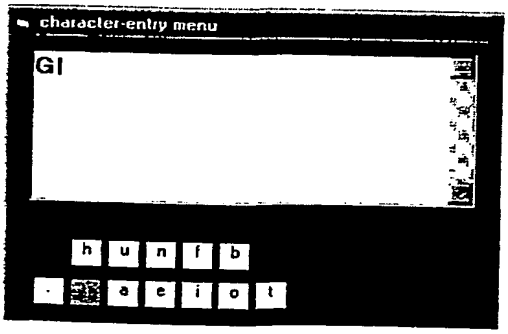


fig 11F

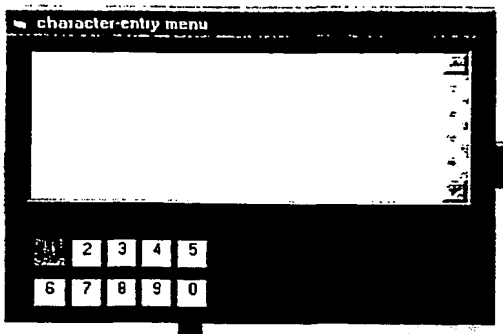


fig 12A

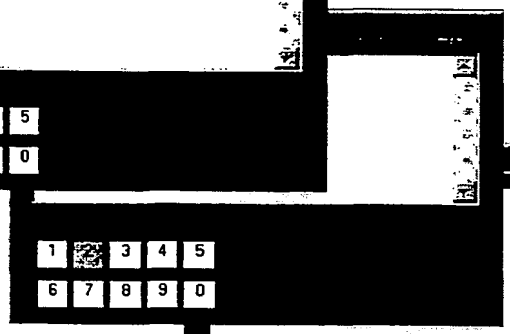


fig 12B

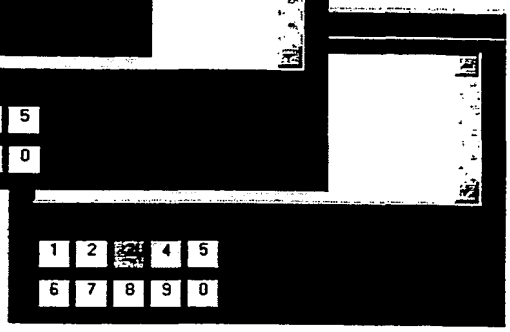


fig 12C

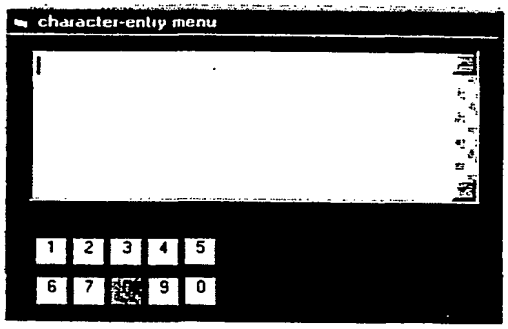


fig 12D

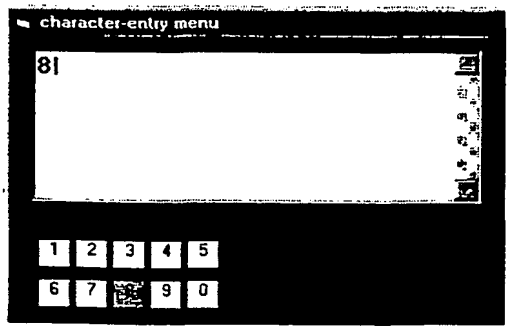


fig 12E

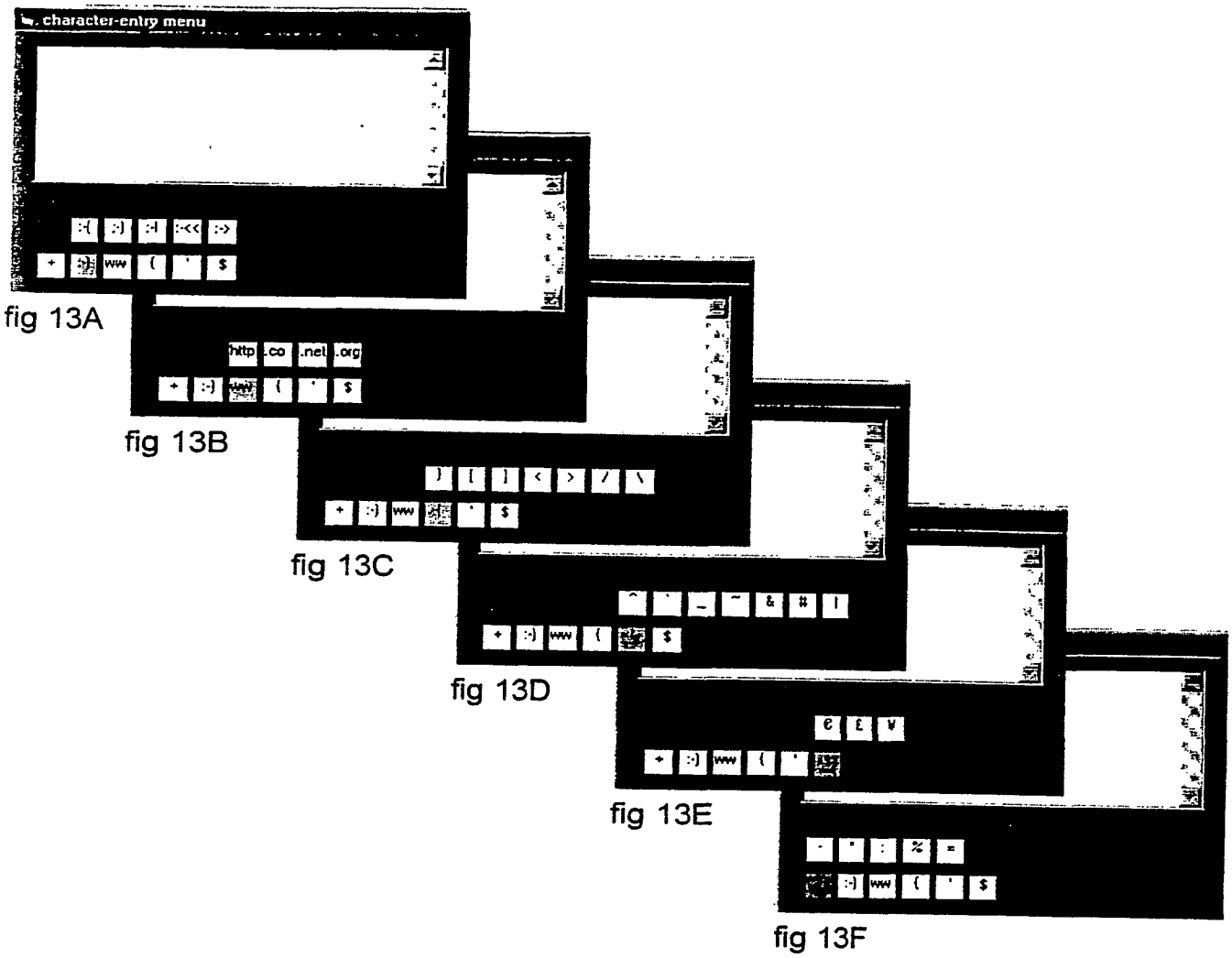


fig 13A

fig 13B

fig 13C

fig 13D

fig 13E

fig 13F

fig 14A

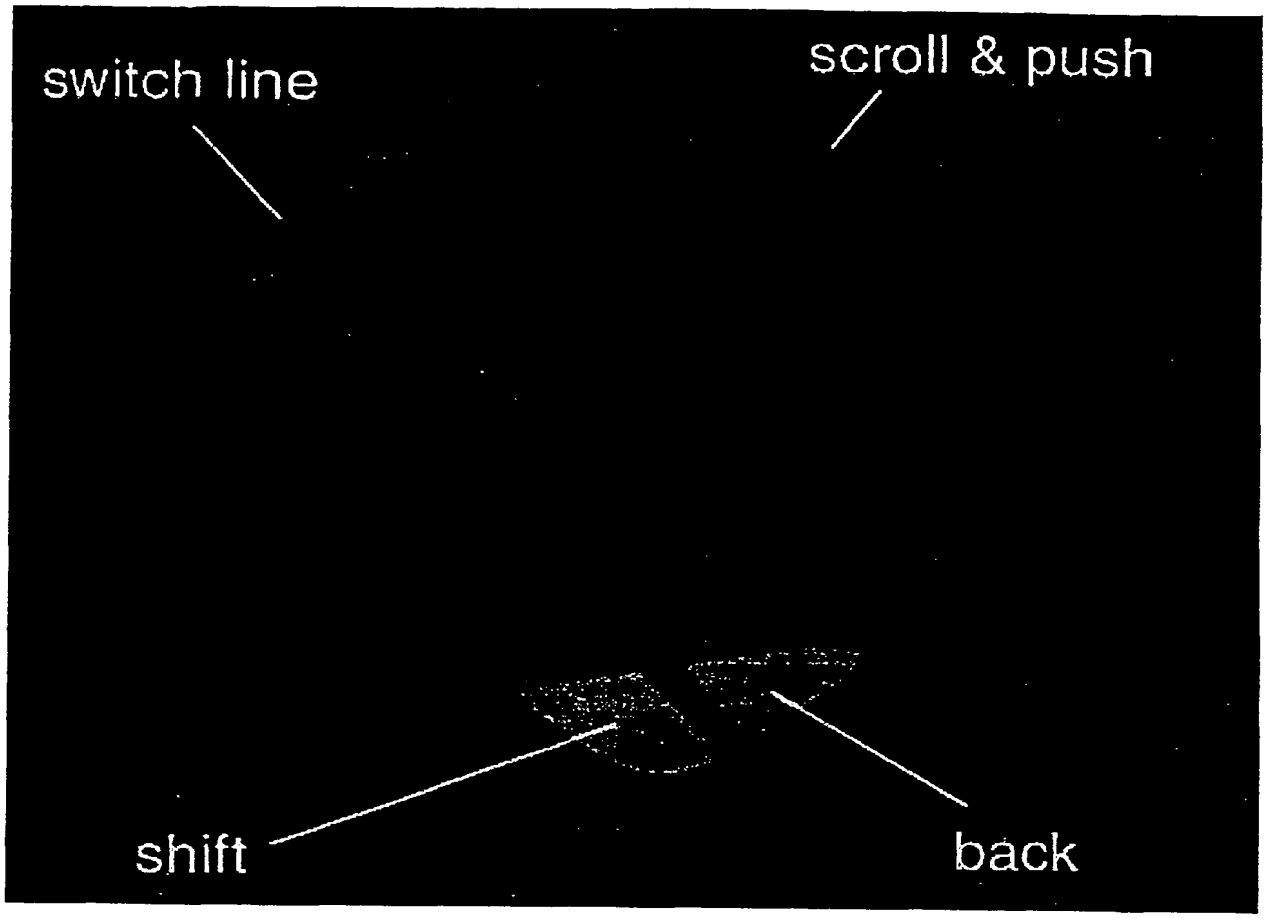
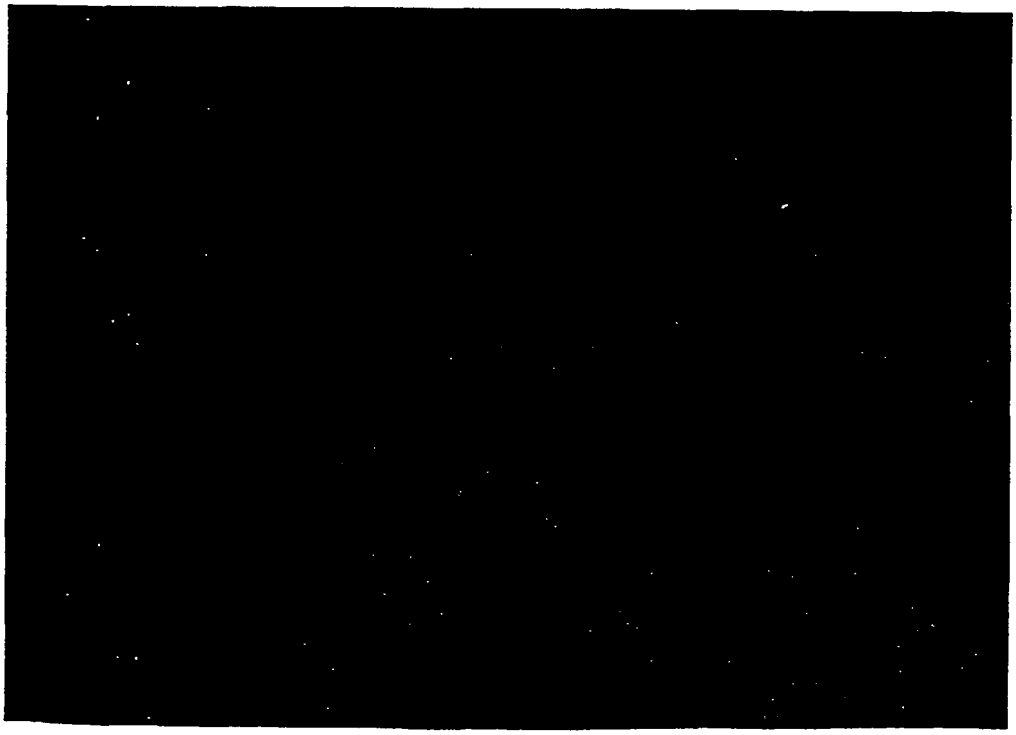


fig 14B



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